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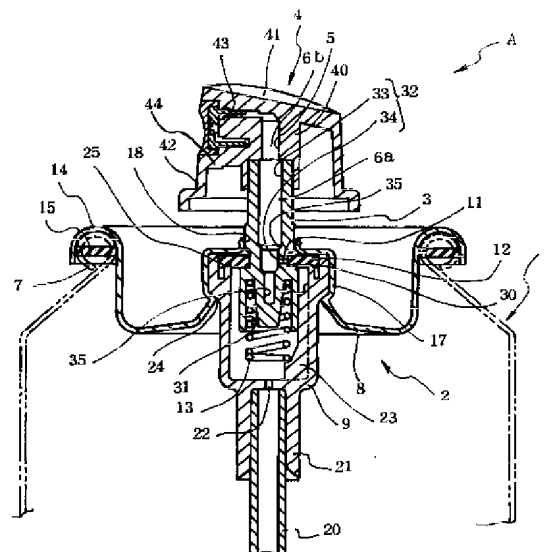
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(54) 【発明の名称】 エアゾール製品

(57) 【要約】

【課題】 噴射量が少なく、しかも液垂れおよび詰まりが生じないエアゾール製品を提供する。

【解決手段】 噴射孔 57 の径が 0.08~0.15 mm のノズル 43 を備えたボタン 4 と、そのボタンが取り付けられるステム 3 と、そのステムの上部通路 33 およびボタン 4 の通路 5 内の空間に挿入されるフィルタ 6 とを備えたエアゾール製品 A。フィルタ 6 は、各断面積がノズル 43 の噴射孔 57 の断面積よりも小さく、かつ、全断面積が噴射孔 57 の断面積よりも大きい複数の微少通路 60 を有する。



A: エアゾール製品

1: 容器本体

2: バルブ

3: ステム

4: ボタン

5: ステム挿通孔

6: フィルター

32: 通路

33: 上部通路

34: 下部通路

43: ノズル

【特許請求の範囲】

【請求項1】 噴射孔の径が0.08～0.15mmのノズルを備えたボタンと、そのボタンが取り付けられるステムと、そのステムの上部空間およびボタンのステム連通通路内の空間に挿入されるフィルタとを備え、そのフィルタが、各断面積がボタンの噴射孔の断面積よりも小さく、かつ、全断面積が噴射孔の断面積よりも大きい複数の微少通路を有するエアゾール製品。

【請求項2】 前記微少通路がフィルタの一端から他端まで貫通している請求項1記載のエアゾール製品。

【請求項3】 各微少通路の断面積が $5 \times 10^{-5} \sim 0.015 \text{ mm}^2$ である請求項1記載のエアゾール製品。

【請求項4】 噴射量が0.1～0.3g/秒である請求項1、2または3記載のエアゾール製品。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明はエアゾール製品に関する。さらに詳しくは、噴射量が少ないにもかかわらず、液垂れ現象（アフタードロー）および詰まりが生じにくいエアゾール製品に関する。

【0002】

【従来の技術】ヘアスプレーや化粧水スプレーといった霧状で噴射するエアゾール製品は多数あるが、内容物をポイント的に噴射したい場合や、目や鼻、口などの粘膜付近で噴射する場合、あるいは医薬品のように使用しうる有効成分が限定されている製品などでは、使用性や安全性を考慮して噴射量を少なくすることが望まれる。

【0003】噴射量を少なくする場合、基本的にはバルブのステム孔やボタン（押しボタン）の噴射孔の径を小さくする。さらに特開平7-132981号公報や特開平10-218262号公報に記載されているように、通路内に所定形状の部材を挿入することにより、1本または2本以上の細長い隙間流路を形成し、それにより流路断面積を小さくしたり流路抵抗を大きくする方法がある。

【0004】しかし前記バルブやボタンの孔径を小さくしたり、通路断面積を小さくする従来の方法では、微細な不溶解物を含む内容物や乾燥して皮膜をつくる樹脂を含む内容物を噴出させる場合、小さく絞った孔や通路で詰まりが発生する問題がある。そのため孔径や通路の径は0.2mmが限度とされ、詰まりやすい内容物ではそれ以上噴射量を少なくすることが困難である。さらに詰まりが発生しにくい内容物であっても、ボタンの噴射孔径を小さくしたエアゾール製品では、バルブの操作でステム孔の開放を止めた後であってもステム孔とボタン噴射孔の間に残っている内容物が噴射される液垂れ現象が起こる。

【0005】他方、液垂れ現象に関しては、特公昭58-31980号公報に、ボタン内の空間体積（噴孔とステム連通通路間の体積）を0.03ml以下にしてその

空間に残る内容物を少なくし、それによって、噴射後の液垂れを防止することが記載されている。しかしこの液垂れ防止の方法は、ボタンの噴孔の径が0.2mm以上の通常の噴射量のエアゾール製品の場合しか有効でなく、たとえば径を0.08mm程度にすると、ステムの上部空間に残った内容物により液垂れが生ずる。さらにヘアスプレーのような、皮膜形成性の合成樹脂を含有する内容物を噴射させる場合は、ボタン内での内容物の通路が非常に狭いため、内容物に含有された合成樹脂が乾燥して詰まりが生じやすい。

【0006】また、特開平10-329879号公報には、内容物の流路に5～100 μm のたがいに連通する微細な孔を有する焼結体を挿入して、流量を抑制する方法が記載されており、アフタードロー（液垂れ）が少なくなる効果についても記載されている。しかし噴射量が少なくなるだけで、液垂れの問題は充分には改善されるに至っていない。さらに焼結体では多数の孔がランダムに配置されているので、通路としては複雑に折れ曲がった経路となる。すなわち1つの孔を通過しても、その奥にあるつぎの孔と孔の間の壁に遮られる。そのため、その壁に樹脂などが付着して詰まりやすくなる。

【0007】

【発明が解決しようとする課題】本発明は噴射量が少なく、しかも液垂れおよび詰まりが生じないエアゾール製品を提供することを技術課題としている。

【0008】

【課題を解決するための手段】本発明のエアゾール製品は、噴射孔の径が0.08～0.15mmのノズルを備えたボタンと、そのボタンが取り付けられるステムと、そのステムの上部空間およびボタンのステム連通通路内の空間に挿入されるフィルタとを備え、そのフィルタが、各断面積がボタンの噴射孔の断面積よりも小さく、かつ、全断面積が噴射孔の断面積よりも大きい複数の微少通路を有することを特徴としている。

【0009】前記微少通路は、フィルタの一端から他端まで貫通しているのが好ましい。また各微少通路の断面積が $5 \times 10^{-5} \sim 0.015 \text{ mm}^2$ であるものが好ましい。さらに噴射量は0.1～0.3g/秒とするのが好ましい。

【0010】

【発明の実施の形態】つぎに図面を参照しながら本発明のエアゾール製品の実施の形態を説明する。図1は本発明のエアゾール製品の一実施形態を示す要部断面図、図2は図1の要部拡大図、図3aおよび図3bはそれぞれ本発明にかかわるフィルタの一実施形態を示す要部斜視図および断面図、図4aおよび図4bはそれぞれ本発明にかかわるフィルタの他の実施形態を示す要部斜視図および断面図、図5aは本発明にかかわるボタンおよびノズルの他の実施形態を示す断面図、図5bはそのV-V線断面図である。

【0011】図1に示すエアゾール製品Aは、容器本体1と、その上端開口部に取り付けられるバルブ2と、そのバルブ2のステム3に嵌着されるボタン4と、ステム3の内部およびボタン4内のステムと連通路5の内部に挿入されるフィルタ6とを備えている。

【0012】容器本体1は従来公知のものをいずれも使用しうる。通常は耐圧性のアルミニウムやブリキなどの金属缶や、ポリエチレンテレフタレート、ポリエチレン、ポリプロピレン、ポリアミド、ポリカーボネートなどの合成樹脂容器であるが、ガラスなどの他の素材のものも使用しうる。この実施形態では、容器本体1の上端開口部の周囲に、バルブを取り付けるためのビード部7が設けられている。容器本体1の中には、プロペラントと原液が充填される。

【0013】バルブ2も公知のものを使用しうる。本実施形態では、バルブ2は容器本体1への取り付け部を備えたマウンティングカップ8と、マウンティングカップの中央部に固定されるハウジング9と、ハウジング内に配置される前述のステム3と、ハウジング9とステム3の間に介在され、ステム孔11を塞ぐバルブラバー12と、ステム3を上方に付勢するバネ13とを備えている。

【0014】マウンティングカップ8はたとえば金属薄板をプレス成形したものであり、その周辺部に断面半円状のフランジ部14が容器本体1への取り付け部として形成されている。フランジ部14は環状のガスケット15を介して容器本体1のビード部7に被せられる。フランジ部14の内側には下向きに延びる円筒壁16が形成されている。この円筒壁16は容器本体1のビード部7内に嵌合される。マウンティングカップ9の中央部には、有底筒状のハウジング取り付け部17が形成されている。ハウジング取り付け部17の下部は内向きにクリンチされ、ハウジング9の段部と係合することによりハウジング9を固定している。マウンティングカップ9の上面中央、すなわちハウジング取り付け部17の天面中央には、ステム3を通す貫通孔18が形成されている。

【0015】前記ハウジング9は有底筒状の形態を有し、下部にディップチューブ20を取り付ける筒状突起21を有する。ハウジング9の底部にはバルブ内部と容器本体1の内部との間を連通する孔22が形成されている。ハウジング9の内部には、ステム3の下部を上下に案内するリブ23が放射状に数枚設けられ、そのリブ23の下端にバネ13の下端を係止している。ハウジング9の上部外周には、マウンティングカップ8のバルブ取り付け部17をクリンチするための段部24が設けられている。さらに上面にはバルブラバー12を挿入する凹部25が形成されている。ハウジング9は通常はポリアミド、ポリアセタール（ジュラコン）、ポリエチレン、ポリプロピレンなどの合成樹脂製である。

【0016】前記ステム3は筒状を呈し、上下方向の中

間部にはバルブラバー12の内縁部と嵌合する環状溝30が形成されている。環状溝30の下側の側面は、ステム3の上方への抜けを防ぐように、ステムの軸心に対して直角である。上側の側面はステム3を押し下げたときにバルブラバー12の内縁側を下向きに湾曲させるため、テーパ面になっている。その環状溝30から下側は、ハウジング9のリブ23と摺接する円筒面になっている。またステム3の下端側には、バネ13の上部を収容する環状深溝31が形成されている。ステム3の内部には、上端に開口する通路32が形成されている。

【0017】その通路32は、上部側の径が大きい上部通路33と、その下側のいくらか小径の下部通路34とからなり、下部通路34の下側には深穴35が設けられている。下部通路34は環状溝30と対応する部位に設けられ、下部通路34と環状溝30の間を仕切る壁、すなわちステム3内の通路32と環状溝30の間を仕切る壁に、前述のステム孔11が形成されている。ステム孔11の内径は通常0.3～0.6mm程度である。

【0018】上部通路33の内径は、通常1.8～2.3mm程度であり、長さは6～9mm程度である。下部通路34の内径は、通常1.5～1.8mm程度であり、長さは1.5～2.5mm程度である。したがって上部通路33と下部通路34の間に段部35が形成される。この実施形態では段部35はテーパ状になっている。ステム孔11の内径は通常0.3～0.6mm程度であり、長さ、すなわちステム孔11が形成されている壁の厚さは、通常0.5～1.0mm程度である。ステム3は通常はポリアミド、ポリアセタール（ジュラコン）、ポリエチレン、ポリプロピレンなどの合成樹脂製である。

【0019】前記ボタン4はステム3に取り付けるための中央部40と、その上端に設けた指押し部41と、その指押し部41の周囲から下方に延びる筒状の外壁42と、その外壁の前側と中央部40とを連続させてノズル43を取り付けるようにしたノズル取り付け部44とを備えている。ボタン4は通常はポリアミド、ポリアセタール（ジュラコン）、ポリエチレン、ポリプロピレンなどの合成樹脂製である。中央部40と外壁42とを連結する補強リブは省略している。

【0020】中央部40の下面側にはステム3の上端近辺と嵌合する円柱状のステム挿入孔45が形成され、そのステム挿入孔45の上面から上方に、噴孔につながるステム連通路（縦通路）5が延びている。ステム連通路5の内径は、通常、1.0～3.5mm程度であり、長さはボタン4の高さにより変わるが、通常は1～10mm程度である。

【0021】外壁42の前側面には、ノズル43の前側面と嵌合する凹所46が形成されており、さらにノズル43の後部を嵌入する環状の深溝47が形成されている。環状の深溝47はノズル取り付け部44内に入り込

んでいる。環状の深溝43の上部から連通路48が後方に延び、前述のステム連通路5の上端と連通している。ノズル取り付け部44のうち、環状の深溝43で囲まれる円柱部49とノズル43の後部との間には隙間50が形成され、内容物が通る環状の通路となっている。また円柱部49の前端部には段部51が形成され、その環状の通路をいくらか広げるようにしている。

【0022】前記ノズル43は、凹所46の底面および円柱部49の前面と当接する円板状の前面部52と、その後方に延びる円筒状の後部53とを有する。前面部52の表面には浅い凹所54が形成され、背面にはいくらか深い凹所55が形成されている。そしてその間の壁56の中央に、噴射孔57が形成されている。また背面の凹所55から半径方向に溝58が形成されている。前面の浅い凹所54は噴射パターン（拡がり）を小さくする場合に設けるものであり、その必要がなければとくに設けなくてもよい。ノズル43は通常はポリアミド、ポリアセタール（ジュラコン）、ポリエチレン、ポリプロピレンなどの合成樹脂により成形される。ノズル43の後部53の外周面には、ボタン4の環状の深溝47の外側の壁面と係合する係止突起59が設けられている。

【0023】噴射孔57の内径は0.08mm以上（断面積ではほぼ0.005mm²以上）、好ましくは0.09mm以上である。また上限はほぼ0.15mm以下（断面積ではほぼ0.018mm²以下）、好ましくは0.13mm以下である。噴射孔57の内径を0.08mmよりも小さくすると、詰まりが生じやすくなる。また0.15mmよりも大きくすると、噴射量が大きくなり、好ましくない。前記の壁56の厚さ、すなわち噴射孔57の長さは0.1～0.5mm程度、好ましくは0.15～0.4mm程度である。それより長い場合は溝58の効果がなくなり、噴射パターン（拡がり角度）が小さくなる。また短い場合は噴射の勢いで撓みやすく、噴孔の大きさが変わりやすい。

【0024】前記フィルタ6は図3aに示すように、円柱状の部材であり、その内部に軸方向に延びる複数本の微少通路60が形成されている。フィルタ6はたとえばポリアミド、ポリアセタール（ジュラコン）、ポリエチレン、ポリプロピレンなどの合成樹脂の押し出し成型品であり、硬質、軟質のいずれの合成樹脂も使用しうる。ただし噴射圧力によりフィルタ6が変形しない程度の強度が必要である。微小通路60が変形して径や長さが変動すると、所期の効果が達成できないからである。また細い繊維状の合成樹脂を円柱状に束ねて硬化したものであってもよい。

【0025】この実施形態では図3bに示すように、微少通路60は断面円形である。ただし断面形状はこれに制限されるものではなく、四角形、三角形、五角形、楕円形など、種々の形状を採用しうる。またこの実施形態では微少通路60は外側に8本、内側に3本で、合計1

1本設けられている。しかし微少通路の配置、本数はそれに限定されることはない。

【0026】この実施形態では1本の微少通路60の断面積は微少通路の本数によって異なるが、少なくとも0.015mm²以下、好ましくは0.013mm²以下であり、噴射孔57の断面積より小さくしている。微少通路60が円形の場合は、その内径は0.14mm以下、好ましくは0.13mm以下となる。なお比率でいえば、微少通路60の断面積は、噴射孔57の断面積の90%以下で、好ましくは80%以下である。微少通路の断面積が上記の上限よりも大きい場合は、噴射孔57で詰まり易い微粒子をあらかじめせき止めるフィルタとしての働きが低くなる。

【0027】また、微少通路の断面積の下限は8×10⁻⁵mm²程度であり、円形の場合は直径が0.01mm程度、比率では噴射孔の断面積の10%程度である。断面積がその下限よりも小さい場合は、微少通路60内で詰まりを生ずる可能性が高くなる。

【0028】すべての微少通路60の断面積を合わせた全断面積は、噴射孔57の断面積よりも大きく、たとえば0.02mm²以上、好ましくは0.03mm²以上であり、2mm²以下、好ましくは1mm²以下である。比率でいえば、噴射孔の断面積の1.3～200倍程度、好ましくは1.5～150倍である。全断面積が上記の上限よりも大きい場合は、噴出量を抑制する作用が低くなる。また、逆に全断面積が上記の下限よりも小さい場合は噴射量が小さくなり過ぎ、詰りやすくなる。

【0029】図1および図2の実施形態では、フィルタ6はステム3の上部通路33内に挿入される第1フィルタ6aと、ボタンのステム連通路5に挿入される第2フィルタ6bとに分かれている。したがって第1フィルタ6aをステム3の上部通路33に密に挿入し、第2フィルタ6bをボタンのステム連通路5に密に挿入した後、ボタン4をステム3に容易に挿入することができる。ただし第1フィルタ6aと第2フィルタ6bを一体に形成してもよい。

【0030】図4aおよび図4bのフィルタ61は、内部を貫通する微少通路に代えて、表面に長手方向に延びる8本の溝62を有する。溝62は断面半円状である。この溝62は、フィルタ61をステム3の上部通路33に挿入したとき、その内面によって閉じられて微少通路60を形成するものである。なお、フィルタ61をボタンのステム連通路5に挿入したときは、そのステム連通路5の内面と共に微少通路を形成する。

【0031】このような表面に溝62を備えたフィルタ61は、仮に微粒子が詰まっても、ステム3などから抜き出して微粒子を洗浄し、再びステム3などに挿入することにより、容易にもとの性能に復元させることができる。

【0032】溝62の断面形状は、上記の半円状に限定

されるものではなく、たとえば三角形、四角形などの多角形状、半楕円状など、種々の断面形状の溝を採用することができる。また溝62の本数も特に制限はないが、通常は2~10000本、好ましくは5~5000本程度とする。溝61とフィルタの表面と当接する壁面とで形成される微少通路の断面積、容積、断面形状、差し渡しの好ましい範囲は、前述の図3のフィルタ6の微少通路60の断面積、容積、直径と実質的に同じである。

【0033】なお1本のフィルタに対し、図3のような内部を貫通する微少通路と表面に形成した溝とを併用することもできる。

【0034】図5aはボタン本体71と、そのボタン本体71と嵌合させるノズル43の他の実施形態を示している。ボタン本体71の環状の深溝48を囲む円柱部49の後端近辺の表面には、その円柱部の軸線方向に延びる多数の断面三角形の突条72が形成されている。それらの突条72は図5bに示すように、ノズル43の円筒状の後部53の内面53aと嵌合して、多数の通路73を形成するものである。この部分も、内容物中の微粒子の通過を遮る点で、フィルタと同じ作用を奏する。ただし液垂れを防止する効果はないので、図2などのフィルタ5と併用するのが好ましい。

【0035】本発明のエアゾール製品は、霧状で噴射する製品であれば、とくに限定なく使用しうる。原液としては、水、炭素数2~5の1価のアルコール、灯油などの基材に、油脂、ロウ、炭化水素、高級脂肪酸、高級アルコール、エステル類、シリコン、界面活性剤、保湿剤、水溶性高分子、pH調整剤、糖類、アミノ酸類、有機アミン類、酸化防止剤、防錆剤、香料、各種有効成分などを適宜用途に配合したものが用いられる。

【0036】本発明のエアゾール製品に用いる噴射剤としては、液化石油ガス、ジメチルエーテル、ハイドロフルオロカーボンなどのフロン類およびこれらの混合ガ

ス、窒素、炭酸ガス、空気、亜酸化窒素、アルゴンなどの圧縮ガス、あるいはそれらの混合物から構成することができる。容器内の圧力は、0.1~1.0MPa程度、とくに0.2~0.8MPa程度が好ましい。

【0037】なお噴射量は内部圧力が高い場合は、ほぼ噴射孔の断面積にのみ依存し、圧力が低下すると内圧が低下するほど噴射量が低下する。しかしいずれの場合でも、0.1~0.3g/秒程度とするのが好ましい。噴射量が0.1g/秒より少ない場合は噴出が不安定になり、0.3g/秒より多い場合は微量噴射の目的を十分に達することができないからである。

【0038】本発明のエアゾール製品は、具体的には、セツト剤、トリートメント剤、艶出し剤、艶消し剤、染毛剤、脱色剤などの頭髮用スプレー、育毛剤、トニック剤、クレンジング剤（頭皮の脂落とし）などの頭皮用スプレー、化粧水、クレンジング剤、保湿剤、ビタミン剤、美白剤、プレシェービングローション、アフターシェーブローション、収斂剤、日焼け止め、消炎鎮痛剤、殺菌剤、水虫薬、消臭剤、制汗剤、香水、忌避剤などの皮膚用スプレー、口中清涼剤などの口腔用、点鼻薬、点耳薬などの粘膜用スプレー、殺虫剤、消臭剤、芳香剤、ガラスクリーナー、澆水剤、艶出し剤などの家庭用、自動車用スプレー、潤滑剤、錆止め、離型剤などの工業用スプレーなどに適用することができ、とくにヘアスプレーなどの詰まりやすい製品にも好適に使用することができる。

【0039】

【実施例】つぎに本発明のエアゾール製品の実施例について、比較例と比較しながら説明する。

〔実施例1〕

ヘアスプレー処方：以下に示す原液処方およびエアゾール処方でヘアスプレー用の内容物を製造した。

原液処方：

ジアルキルアミノエチルアクリレート／	
アクリル酸アルキルエステル共重合体	8.0重量%
ソルビタンセスキオレエート	0.5
シリコンオイル	0.3
エチルアルコール	91.2
香料	適量

合計 100.0重量%

エアゾール処方：

上記原液	50.0重量%
LPG	50.0

合計 100.0重量%

【0040】図1に示すエアゾール装置に上記の内容物を充填したエアゾール製品を準備すると共に、ステムの上部通路（図2の符号33参照）およびボタンのステム

連通路（図2の符号5参照）に表1に示す条件を備えたブッシュ状のフィルタを挿入して実施例1~5および比較例1、2のエアゾール装置を製造し、詰まり試験を

行った。フィルタの直径は、ステムの上部通路に挿入したもので1.8mm、ステム連通通路に挿入したもので1.5mmとした。

【0041】

【表1】

	ボタン噴孔径 (mm)	微少通路径・ 数(μm×本)	噴射量 (g/秒)	液垂れ	詰まり試験
実施例1	0.1	50×10	0.15	○	○
実施例2	0.1	20×50	0.18	○	○
実施例3	0.1	80×8	0.21	○	○
実施例4	0.15	80×8	0.26	○	○
実施例5	0.08	20×50	0.12	○	○
比較例1	0.15	フィルタなし	0.41	×	×
比較例2	0.1	0.1mm×5	0.33	○	×

【0042】上記の表1における詰まり試験では、(i) サンプル試射、(ii) 25℃にて1週間放置、(iii) 5℃にて1日放置、(i) サンプル試射のサイクルを繰り返した。液垂れおよび詰まり試験の評価は、「○」が良好、「×」が不良を示す。

【0043】表1から分かるように、ボタン噴孔径0.08～0.15mmの範囲で、ボタンの噴射孔の径よりも小さい径の微少通路を備えたフィルタを用いた実施例1～5では、液垂れおよび詰まりの両方に良好な結果が得られた。他方、フィルタを用いない比較例1では、液垂れも詰まり試験も良好でなかった。またボタンの噴孔径と同じ径の通路を備えたフィルタを使用した比較例2のエアゾール装置では、液垂れの防止には効果があったが、詰まり試験の結果が不良であった。また、フィルタの微少通路の本数については、8本のものも50本のものもいずれも良好であった。

【0044】これらの結果から、本発明のエアゾール装置は、液垂れと詰まりの両方を防止しうる効果があることがわかる。

【図面の簡単な説明】

【図1】 本発明のエアゾール製品の一実施形態を示す要部断面図である。

【図2】 図1の要部拡大図である。

【図3】 図3aおよび図3bはそれぞれ本発明にかか

わるフィルタの一実施形態を示す要部斜視図および断面図である。

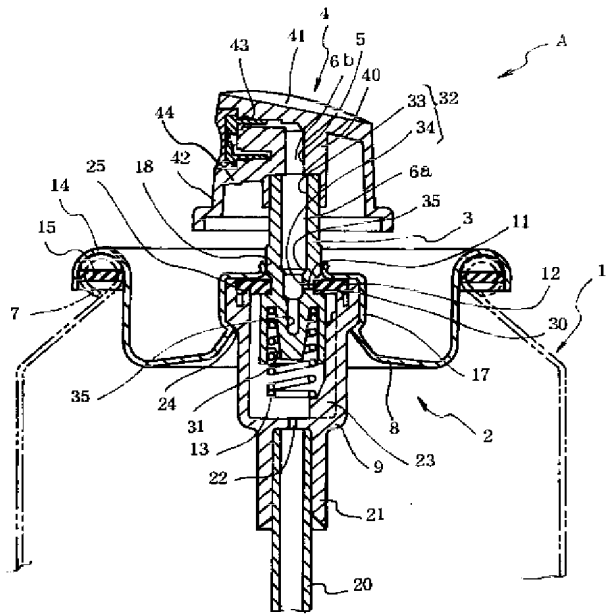
【図4】 図4aおよび図4bはそれぞれ本発明にかかわるフィルタの他の実施形態を示す要部斜視図および断面図である。

【図5】 図5aは本発明にかかわるボタンおよびノズルの他の実施形態を示す断面図であり、図5bはそのV-V線断面図である。

【符号の説明】

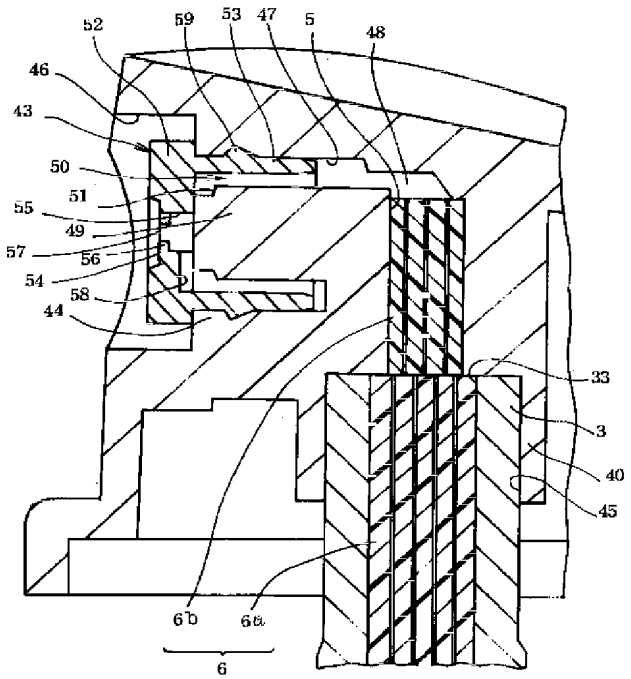
- A エアゾール製品
- 1 容器本体
- 2 バルブ
- 3 ステム
- 4 ボタン
- 5 ステム挿通孔
- 6 フィルタ
- 32 通路
- 33 上部通路
- 34 下部通路
- 43 ノズル
- 57 噴射孔
- 60 微少通路
- 61 フィルタ
- 62 溝

【図1】

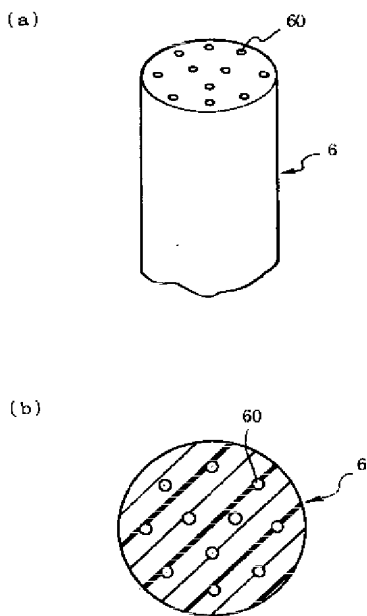


- A: エアゾール製品
 1: 容器本体
 2: バルブ
 3: ステム
 4: ボタン
 5: ステム挿通孔
 6: フィルター
 32: 通路
 33: 上部通路
 34: 下部通路
 43: ノズル

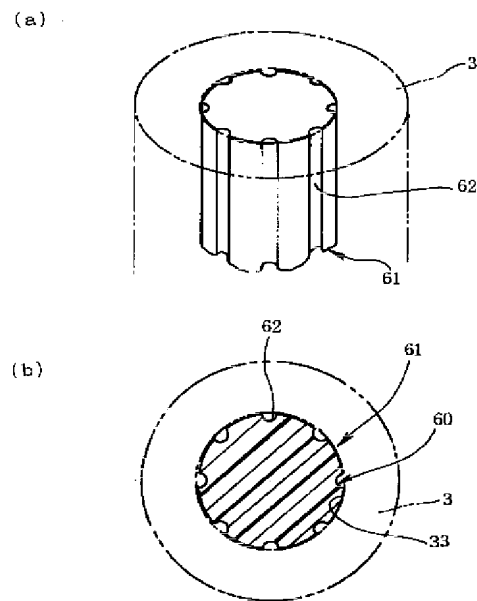
【図2】



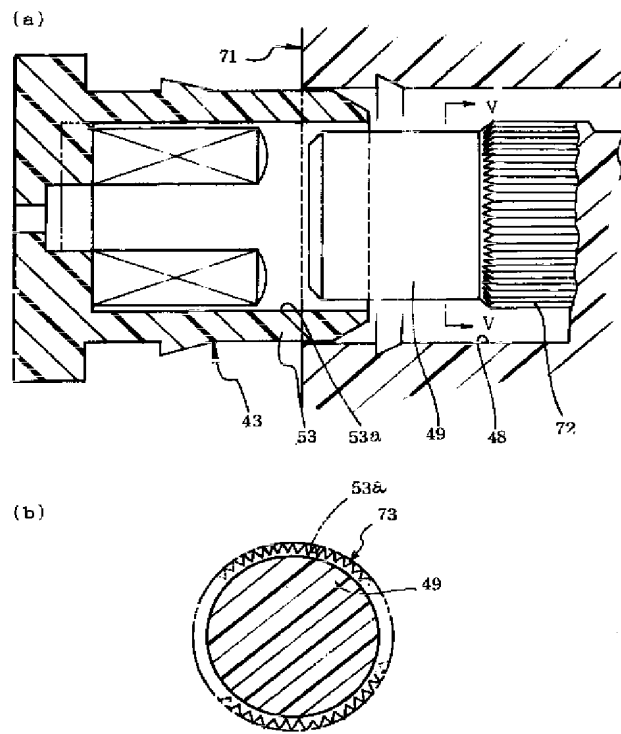
【図3】



【図4】



【図5】





(19)

JAPANESE PATENT OFFICE

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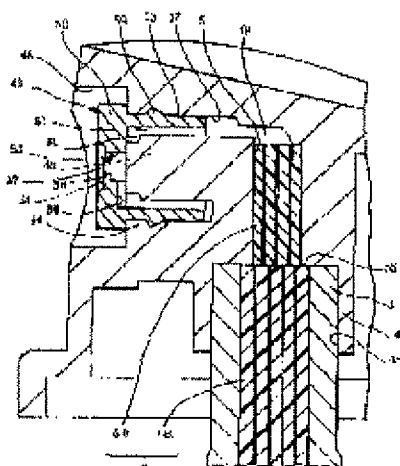
(54) **AEROSOL PRODUCT**

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(57) Abstract:

PROBLEM TO BE SOLVED: To provide an aerosol product of which the jetting amount is small, and in addition, wherein a liquid dripping and a clogging are not generated.

SOLUTION: This aerosol product is equipped with a button equipped with a nozzle 43 wherein the diameter of a jetting hole 57 is 0.08-0.15 mm, a stem 3 to which the button is attached, and a filter 6 being inserted in the spaces of an upper passage 33 of the stem and a passage 5 of the button. The filter 6 has a plurality of fine passages wherein respective cross sectional areas are smaller than the cross sectional area of the jetting hole 57 of the nozzle 43, and also, the total cross sectional area of the fine passages is larger than the cross sectional area of the jetting hole 57.



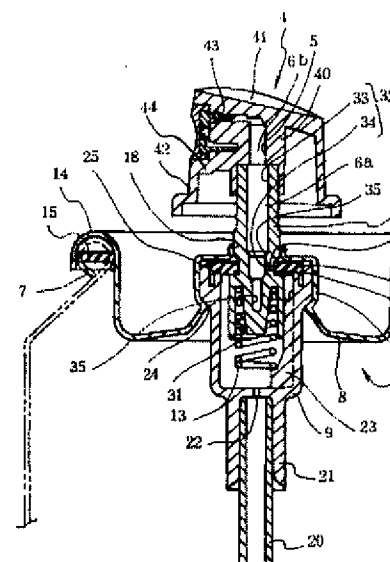
JAPANESE [JP.2000-238868,A]

CLAIMS DETAILED DESCRIPTION
TECHNICAL FIELD PRIOR ART
TECHNICAL PROBLEM MEANS EXAMPLE
DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

Drawing selection

Representative drawing



1: エアゾール製品
1: 容器本体
2: バルブ
3: ステム
4: ボタン
5: ステム挿通孔
6: フィルター
32: 通路
33: 上部通路
34: 下部通路
43: ノズル

[Translation done.]

BACK

NEXT

MENU

SEARCH

HELP

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CLAIMS

[Claim(s)]

[Claim 1] Aerosol products comprising:

A button provided with a nozzle whose path of a nozzle is 0.08-0.15 mm.

A stem to which the button is attached.

Two or more very small passages provided with a filter inserted in upper space of the stem, and space in a stem free passage passage of a button where each cross-section area of the filter is smaller than a cross-section area of a nozzle of a button and where a total cross section is larger than a cross-section area of a nozzle.

[Claim 2] The aerosol products according to claim 1 which said very small passage has penetrated from one end of a filter to the other end.

[Claim 3] The aerosol product according to claim 1 whose cross-section areas of each very small passage are 5×10^{-5} - 0.015 mm^2 .

[Claim 4] The aerosol product according to claim 1, 2, or 3 whose injection quantity is 0.1-0.3g/second.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to aerosol products. In more detail, although there is little injection quantity, it is related with the aerosol products which a liquid lappet phenomenon (after draw) and plugging do not produce easily.

[0002]

[Description of the Prior Art]Although a large number [the aerosol products through which it passes and which are injected with misty state, such as Asprey and a face toilet spray,], When injecting contents near [, such as a case where he would like to inject in point, eyes, a nose, a mouth,] membrane, in the product to which the active principle which can be used like drugs is limited, to lessen the injection quantity in consideration of usability or safety is desired.

[0003]When lessening the injection quantity, the path of the stem hole of a valve or the nozzle of a button (push button) is fundamentally made small. By inserting the member of specified shape into a passage, 1 or two long and slender gap channels or more are formed, and there is the method of making a passage sectional area small by that cause, or enlarging passage resistance as furthermore indicated to JP,7-132981,A or JP,10-218262,A.

[0004]However, when making the aperture of said valve or a button small or making the contents which contain a detailed non-melted object in the conventional method of making passage sectional areas small, and the contents containing the resin which dries and builds a coat blow off there is a problem which plugging generates at the hole extracted small or a passage. Therefore, an aperture and the path of a passage are difficult to lessen the injection quantity more in the contents which 0.2 mm is made into a limit and are easily got blocked. In the aerosol products which made the diameter of a nozzle of the button small even if it was contents which plugging does not generate furthermore easily, even if it is after stopping opening of a stem hole by operation of a valve, the liquid lappet phenomenon in which the contents which remain between the stem hole and the button nozzle hole are injected

happens.

[0005] On the other hand, about a liquid lappet phenomenon, the contents which set space volume (volume between a nozzle hole and a stem free passage passage) in a button to 0.03 ml or less, and remain in the space at JP,58-31980,B are lessened, and preventing the liquid lappet after injection by it is indicated. However, the method of this liquid lappet prevention is effective only when the path of the nozzle hole of a button is an aerosol product with a usual injection quantity of 0.2 mm or more, and if a path shall be about 0.08 mm, for example, a liquid lappet will produce it with the contents which remained in the upper space of the stem. Since the passage of the contents within a button is very narrow when making the contents containing a film-forming synthetic resin still like hair spray inject, the synthetic resin contained in contents dries and it is easy to produce plugging.

[0006] To JP,10-329879,A, the sintered compact which has a 5-100-micrometer detailed hole which is mutually open for free passage is inserted in the channel of contents, and the method of controlling a flow is indicated.

The effect whose after draw (liquid lappet) decreases is also indicated.

However, only by the injection quantity decreasing, it is not fully come to improve the problem of a liquid lappet. Since many holes are furthermore arranged at random by the sintered body, it becomes the course intricately bent as a passage. That is, it is interrupted by the wall between the following hole and hole in the back even if it passes one hole. Therefore, resin etc. adhere to the wall and it becomes easy to get it blocked.

[0007]

[Problem(s) to be Solved by the Invention] This invention has little injection quantity and it is making into the technical technical problem to provide the aerosol products which a liquid lappet and plugging moreover do not produce.

[0008]

[Means for Solving the Problem] A button in which aerosol products of this invention were provided with a nozzle whose path of a nozzle is 0.08-0.15 mm, It has a stem to which the button is attached, and a filter inserted in upper space of the stem, and space in a stem free passage passage of a button, It is characterized by having two or more very small passages where a total cross section is larger than a cross-section area of a nozzle smaller [the filter / each cross-section area] than a cross-section area of a nozzle of a button.

[0009] As for said very small passage, it is preferred to have penetrated from one end of a filter to the other end. That whose cross-section areas of each very small passage are 5×10^{-5} - 0.015 mm^2 is preferred. As for injection quantity, it is still more preferred to consider it as a second in 0.1-0.3g /.

[0010]

[Embodiment of the Invention] The embodiment of the aerosol products of this invention is described referring to drawings next. The important section sectional view and drawing 2 which drawing 1 shows one embodiment of the aerosol products of this invention The

important section enlarged drawing of drawing 1. The important section perspective view and sectional view showing one embodiment of the ~~filter~~ in connection with this invention in drawing 3 a and respectively drawing 3 b, Sectional view and drawing 5 b which shows other embodiments of the important section perspective view showing other embodiments of the ~~filter~~ in connection with this invention in drawing 4 a and respectively drawing 4 b and a sectional view, the button in connection with this invention in drawing 5 a, and a nozzle is the V-V line sectional view.

[0011]The aerosol products A shown in drawing 1 are provided with the following.

Package body 1.

The valve 2 moreover attached to an end opening part.

The button 4 attached in the stem 3 of the valve 2.

The ~~filter~~ 6 inserted in the stem 3 and the stem in the button 4 and the inside of the free passage passage 5.



[0012]The package body 1 can use each publicly known thing conventionally. Usually, although it is synthetic resin vessels, such as metal cans, such as pressure-resistant aluminum and tin, polyethylene terephthalate, polyethylene, polypropylene, polyamide, polycarbonate, the thing of other raw materials, such as glass, can also be used. According to this embodiment, the bead part 7 for attaching a valve to the circumference of the upper end opening of the package body 1 is formed. The package body 1 is ~~filled~~ up with propellant and an undiluted solution.

[0013]The valve 2 can also use a publicly known thing. The mounting cup 8 in which the valve 2 was provided with the mounting part to the package body 1 in this embodiment, It intervened between the housing 9 ~~fixed~~ to the center section of the mounting cup, the above-mentioned stem 3 arranged in housing, and the housing 9 and the stem 3, and has the valve rubber 12 which takes up the stem hole 11, and the spring 13 which energizes the stem 3 up.

[0014]The mounting cup 8 carries out press forming of the metallic thin plate, and the ~~flange~~ 14 of section semicircular state is formed in the periphery as a mounting part to a package body. The ~~flange~~ 14 is put on the bead part 7 of the package body 1 via the annular gasket 15. The cylindrical wall 16 prolonged downward is formed inside the ~~flange~~ 14. This cylindrical wall 16 ~~fits~~ in in the bead part 7 of the package body 1. The cylinder-like-object-with-base-like housing mounting part 17 is formed in the center section of the mounting cup 9. The clinch of the lower part of the housing mounting part 17 is carried out for inner, and it is ~~fixing~~ the housing 9 by engaging with the step of the housing 9. The breakthrough 18 which lets the stem 3 pass is formed in the center of the upper surface of the mounting cup 9 of a top panel, i.e., the center of the housing mounting part 17.



[0015]Said housing 9 has a cylinder-like-object-with-base-like gestalt and has the cylindrical projection 21 which attaches the dipping tube 20 to the lower part. The hole 22 which opens

between the insides of a valve and the package body 1 for free passage is formed in the pars basilaris ossis occipitalis of the housing 9. Several ribs 23 which show the lower part of the stem 3 up and down to the inside of the housing 9 were formed radiately, and have stopped the lower end of the spring 13 to the lower end of the rib 23. The step 24 for carrying out the clinch of the valve mounting part 17 of the mounting cup 8 is formed in the upper part periphery of the housing 9. Furthermore, the crevice 25 which inserts the valve rubber 12 is formed in the upper surface. The housing 9 is usually products made of a synthetic resin, such as polyamide, polyacetal (Duracon), polyethylene, and polypropylene.

[0016] Said stem 3 presents tubed and the common-law marriage part of the valve rubber 12 and the circular sulcus 30 which s in are formed in the pars intermedia of a sliding direction. The side of the circular-sulcus 30 bottom is right-angled to the axial center of a stem so that the omission to the upper part of the stem 3 may be prevented. The upper side is made into the taper surface in order to incurvate the common-law marriage side of the valve rubber 12 downward, when the stem 3 is depressed. The bottom is made into the cylinder side which s to the rib 23 of the housing 9 from the circular sulcus 30. The annular deep groove 31 in which the upper part of the spring 13 is accommodated is formed in the lower end side of the stem 3. The passage 32 which carries out an opening to an upper bed is formed in the inside of the stem 3.

[0017] the upper path 33 where the passage 32 has a large path by the side of the upper part, and some of its bottom -- it consists of the lower path 34 of a byway, and the deep hole 35 is formed in the lower path 34 bottom. The lower path 34 is established in the circular sulcus 30 and a corresponding part, and the above-mentioned stem hole 11 is formed in the wall which divides between the lower path 34 and the circular sulcus 30, i.e., the wall which divides between the passage 32 in the stem 3, and the circular sulcus 30. The inside diameter of the stem hole 11 is usually about 0.3-0.6 mm.

[0018] The inside diameter of the upper path 33 is usually about 1.8-2.3 mm, and length is about 6-9 mm. The inside diameter of the lower path 34 is usually about 1.5-1.8 mm, and length is about 1.5-2.5 mm. Therefore, the step 35 is formed between the upper path 33 and the lower path 34. The step 35 is made into tapered shape in this embodiment. The inside diameter of the stem hole 11 is usually about 0.3-0.6 mm, and the thickness of the wall in which the length 11, i.e., a stem hole, is formed is usually about 0.5-1.0 mm. The stems 3 are usually products made of a synthetic resin, such as polyamide, polyacetal (Duracon), polyethylene, and polypropylene.

[0019] The center section 40 and the nger push part 41 for attaching said button 4 to the stem 3 provided in the upper bed, It has the nozzle mounting part 44 which makes the center section 40 continue the front side of the tubed outer wall 42 caudad prolonged from the circumference of the nger push part 41, and its outer wall, and attached the nozzle 43. The buttons 4 are usually products made of a synthetic resin, such as polyamide, polyacetal (Duracon), polyethylene, and polypropylene. The reinforcing rib which connects the center

section 40 and the outer wall 42 is omitted.

[0020]The upper bed neighborhood of the stem 3 and the cylindrical stem insertion hole 45 which ~~is~~ is in were formed in the undersurface side of the center section 40, and the stem free passage passage (longitudinal passage) 5 connected with the upper part from the upper surface of the stem insertion hole 45 in a nozzle hole has extended. The inside diameter of the stem free passage passage 5 is usually about 1.0-3.5 mm, and although length changes with the height of the button 4, it is usually about 1-10 mm.

[0021]The front part of the nozzle 43 and the hollow 46 which ~~is~~ is in are formed in the front-face side of the outer wall 42, and the annular deep groove 47 which inserts the rear of the nozzle 43 further is formed. The annular deep groove 47 has entered in the nozzle mounting part 44. The communicating hole 48 extends back from the upper part of the annular deep groove 43, and it is open for free passage with the upper bed of the above-mentioned stem free passage passage 5. The crevice 50 is formed between the cylinder part 49 surrounded among the nozzle mounting parts 44 in the annular deep groove 43, and the rear of the nozzle 43, and it has become an annular passage along which contents pass. The step 51 is formed in the front end part of the cylinder part 49, and he is trying to extend some of the annular passage.

[0022]Said nozzle 43 is provided with the following.

The disc-like front part 52 which contacts the bottom of the hollow 46, and the front face of the cylinder part 49.

The cylindrical rear 53 which extends in the back.

The shallow hollow 54 is formed in the surface of the front part 52, and some deep hollows 55 are formed in the back. And the nozzle 57 is formed in the center of the wall 56 in the meantime. The slot 58 is radially formed from the hollow 55 on the back. The hollow 54 where a front face is shallow is formed when making an injection pattern (spread) small, and it is not necessary especially to provide it without the necessity. The nozzle 43 is usually fabricated with synthetic resins, such as polyamide, polyacetal (Duracon), polyethylene, and polypropylene. The lock projection 59 which engages with the wall surface of the outside of the annular deep groove 47 of the button 4 is formed in the peripheral face of the rear 53 of the nozzle 43.

[0023]The inside diameter of the nozzle 57 is 0.09 mm or more preferably 0.08 mm or more (a cross-section area more than about 0.005 mm^2). A maximum is 0.13 mm or less preferably about 0.15 mm or less (a cross-section area below about 0.018 mm^2). If the inside diameter of the nozzle 57 is made smaller than 0.08 mm, it will become easy to produce plugging. If it is made larger than 0.15 mm, the injection quantity becomes large and is not preferred. The thickness of the aforementioned wall 56, i.e., the length of the nozzle 57, is about 0.15-0.4 mm preferably about 0.1-0.5 mm. When longer than it, the effect of the slot 58 is lost, and an injection pattern (spread angle) becomes small. When short, it is easy to be bent by vigor of injection, and the size of a nozzle hole is changeable.

[0024]As said ~~filter~~ 6 is shown in drawing 3 a, it is a cylindrical member and two or more very small passages 60 which extend in shaft orientations at the inside are formed. The ~~filter~~ 6 is an extrusion cast of synthetic resins, such as polyamide, polyacetal (Duracon), polyethylene, and polypropylene, and can use any hard and elastic synthetic resin. However, the intensity which is a grade which does not change the ~~filter~~ 6 by an injection pressure is required. It is because an expected effect cannot be attained if the ~~the~~ path 60 changes and a diameter and length are changed. It may be what bundled the thin ~~fibrous~~ synthetic resin cylindrical and hardened it.

[0025]In this embodiment, as shown in drawing 3 b, the very small passage 60 is a round cross section. However, sectional shape is not restricted to this and can adopt various shape, such as a quadrangle, a triangle, a pentagon, and an ellipse form. In this embodiment, the number of the very small passages 60 is three, and they are provided outside a total of 11 at 8 and the inside. However, arrangement of a very small passage and a number are not limited to it.

[0026]In this embodiment, although the cross-section area of the one very small passage 60 changes with numbers of a very small passage, it is below 0.013 mm^2 preferably, and below at least 0.015 mm^2 makes it smaller than the cross-section area of the nozzle 57. When the very small passage 60 is circular, the inside diameter is preferably set to 0.13 mm or less 0.14 mm or less. If it says by a ratio, the cross-section areas of the very small passage 60 will be 90% or less of cross-section areas of the nozzle 57, and will be 80% or less preferably. When the cross-section area of a very small passage is larger than the above-mentioned maximum, the work as a ~~filter~~ which dams up beforehand the particles easily got blocked with the nozzle 57 becomes low.

[0027]The minimum of the cross-section area of a very small passage is an $8 \times 10^{-5} \text{ mm}^2$ grade, and when circular, diameters are about 10% of the cross-section areas of a nozzle by about 0.01 mm and a ratio. When a cross-section area is smaller than the minimum, a possibility of producing plugging in the very small passage 60 becomes high.

[0028]It is larger than the cross-section area of the nozzle 57, for example, the total cross section which doubled the cross-section area of all the very small passages 60 is more than 0.03 mm^2 preferably, and below 2 mm^2 is [more than 0.02 mm^2] below 1 mm^2 preferably. if it says by a ratio -- 1.3- of the cross-section area of a nozzle -- they are 1.5 to 150 times preferably about 200 times. When a total cross section is larger than the above-mentioned maximum, the operation which controls jetting volume becomes low. When a total cross section is conversely smaller than the above-mentioned minimum, the injection quantity becomes small too much and it becomes easy to get it blocked.

[0029]According to the embodiment of drawing 1 and drawing 2, the ~~filter~~ 6 is divided into the 1st ~~filter~~ 6a inserted into the upper path 33 of the stem 3, and the 2nd ~~filter~~ 6b inserted in the stem free passage passage 5 of a button. Therefore, after inserting the 1st ~~filter~~ 6a in

the upper path 33 of the stem 3 densely and inserting the 2nd filter 6b in the stem free passage passage 5 of a button densely, the button 4 can be easily inserted in the stem 3. However, the 1st filter 6a and the 2nd filter 6b may be formed in one.

[0030]The filter 61 of drawing 4 a and drawing 4 b is replaced with the very small passage which penetrates an inside, and it has the eight slots 62 which extend on the surface at a longitudinal direction. The slot 62 is section semicircular state. When the filter 61 is inserted in the upper path 33 of the stem 3, this slot 62 is closed by that inner surface, and forms the very small passage 60. When the filter 61 is inserted in the stem free passage passage 5 of a button, a very small passage is formed with the inner surface of the stem free passage passage 5.

[0031]Even if the filter 61 which equipped such the surface with the slot 62 gets particles blocked, it can be made to restore to the performance of a basis easily by extracting from the stem 3 etc., washing particles and inserting in the stem 3 etc. again.

[0032]The sectional shape of the slot 62 is not limited to the above-mentioned semicircular state, and the slot of various sectional shape, such as polygonal shape, such as a triangle and a quadrangle, and the shape of a half-ellipse, can be used for it, for example. Although restriction in particular does not have a number of the slot 62, either, 2-10000 are usually preferably made about into 5-5000. The cross-section area of the very small passage formed on the wall surface which contacts the slot 61 and the surface of a filter, capacity, sectional shape, and the desirable range of a diameter are substantially [as the cross-section area of the very small passage 60 of the filter 6 of above-mentioned drawing 3, capacity, and a diameter] the same.

[0033]The very small passage which penetrates an inside like drawing 3, and the slot formed in the surface can also be used together to one filter.

[0034]Drawing 5 a shows other embodiments of the button body 71, its button body 71, and the nozzle 43 made to fit in. The projected rim 72 of the section triangular shape of a large number prolonged in the axial direction of the cylinder part is formed in the surface of the back end neighborhood of the cylinder part 49 surrounding the annular deep groove 48 of the button body 71. As shown in drawing 5 b, those projected rims 72 fit in with the inner surface 53a of the cylindrical rear 53 of the nozzle 43, and form many passages 73. This portion also does the same operation as a filter so at the point which interrupts passage of the particles in contents. However, since there is no effect of preventing a liquid lappet, it is preferred to use together with the filters 5, such as drawing 2.

[0035]The aerosol products of this invention can be especially used without limitation, if it is a product injected with misty state. As an undiluted solution, to substrates, such as water, univalent alcohol of the carbon numbers 2-5, and kerosene. What blended suitably fats and oils, a low, hydrocarbon, higher fatty acid, higher alcohol, ester species, silicone, a surface-active agent, a moisturizer, a water soluble polymer, a pH adjuster, sugars, amino acid, organic amine, an antioxidant, a rust-proofer, perfume, various active principles, etc. with the use is

used.

[0036]As propellants used for the aerosol products of this invention, it can constitute from compressed gas, such as chloro~~flu~~orocarbon, such as lique~~fi~~ed petroleum gas, wood ether, and hydro~~flu~~orocarbon, and these mixed gas, nitrogen, carbon dioxide, air, nitrous oxide, and argon, or those mixtures. As for especially the pressure in a container, about 0.2-0.8 MPa is preferred about 0.1-1.0 MPa.

[0037]When internal pressure of injection quantity is high, the injection quantity falls, so that internal pressure will fall only depending on the cross-section area of a nozzle, if a pressure declines mostly. However, it is preferred to carry out in about 0.1-0.3g/[a second and] in any case. It is because jet becomes unstable, and the purpose of injection cannot fully be attained when [a little] there is more 0.3g /than a second when there is less injection quantity of 0.1g /than a second.

[0038]The aerosol products of this invention specific~~ally~~ A set agent, a treatment agent, Sprays for the hairs, such as polish, a ~~fat~~ting, hair dye, and a decolorant, a hair restorer, Sprays for scalp, such as a tonic agent and a cleansing agent (drop [fat] the scalp), Face toilet, a cleansing agent, a moisturizer, a vitamin tablet, a whitening agent, a pre shaving lotion, An aftershave lotion, an astringent, sunscreen, an antiphlogistic sedative drug, a germicide, For [, such as sprays for the skins, such as an athlete's foot remedy, a deodorizer, an antiperspirant, a perfume, and a repellent and a mouth deodorant] the mouths, Sprays for membrane, such as collunarium and ear dripping medicine, an insecticide, a deodorizer, an aromatic, a glass cleaner, It can apply to industrial use sprays, such as home use, such as a water-repellent and polish, a spray for cars, lubricant, a rust resistor, and a release agent, etc., and can be used conveniently also for products easily got blocked, such as especially hair spray.

[0039]

[Example]The example of the aerosol products of this invention is described below, comparing with a comparative example.

[Example 1]

Hair-spray formula: The contents for hair spray were manufactured by the undiluted solution formula and aerosol formula which are shown below.

Undiluted solution formula: Dialkylamino ethyl acrylate / acrylic-acid-alkyl-ester copolymer 8.0 % of the weight Sorbitan sesquioleate 0.5 silicone-oil 0.3 ethyl-alcohol 91.2 Perfume Optimum dose ----- Sum total 100.0 % of the weight Aerosol formula: The above-mentioned undiluted solution 50.0-% of the weight LPG 50.0 ----- Sum total 100.0 % of the weight

[0040]Prepare the aerosol products which ~~fi~~ed up with the above-mentioned contents the aerosol apparatus shown in drawing 1, and. The ~~fi~~ter of the shape of a bush which equipped the upper path (refer to numerals 33 of drawing 2) of a stem and the stem free passage passage (refer to numerals 5 of drawing 2) of the button with the conditions shown in Table 1 was inserted, the aerosol apparatus of Examples 1-5 and

the comparative examples 1 and 2 was manufactured, and the plugging examination was done. The diameter of a filter is a thing inserted in the upper path of the stem, is a thing inserted in 1.8 mm and a stem free passage passage, and was 1.5 mm.

[0041]

[Table 1]

	ボタン噴孔径 (mm)	微少通路径・ 数(μm×本)	噴射量 (g/秒)	液垂れ	詰まり試 験
実施例1	0.1	50×10	0.15	○	○
実施例2	0.1	20×50	0.18	○	○
実施例3	0.1	80×8	0.21	○	○
実施例4	0.15	80×8	0.26	○	○
実施例5	0.08	20×50	0.12	○	○
比較例1	0.15	フィルタなし	0.41	×	×
比較例2	0.1	0.1mm×5	0.33	○	×

[0042]At the plugging examination in the above-mentioned table 1, the cycle of neglect and (i) sample test ~~filter~~ing was repeated at neglect and (iii)5 ** for one week in (i) sample test ~~filter~~ing and (ii)25 ** on the 1st. In evaluation of a liquid lappet and a plugging examination, ~~filter~~ness and "x" show ["O"] a defect.

[0043]As shown in Table 1, the good result was obtained by both a liquid lappet and plugging in Examples 1-5 using the ~~filter~~ter provided with the very small passage of a path smaller than the path of the nozzle of a button in the range with a diameter of a button nozzle hole of 0.08-0.15 mm. On the other hand, the liquid lappet was also got blocked with the comparative example 1 which does not use a ~~filter~~ter, and an examination was not good, either. Although there was an effect in prevention of a liquid lappet in the aerosol apparatus of the comparative example 2 which uses the ~~filter~~ter provided with the passage of the same path as the diameter of a nozzle hole of a button, the result of the plugging examination was poor. About the number of the very small passage of a ~~filter~~ter, each of 50 things of eight things was also good.

[0044]These results show that the aerosol apparatus of this invention is effective in the ability to prevent both a liquid lappet and plugging.

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TECHNICAL FIELD

[Field of the Invention] This invention relates to aerosol products. In more detail, although there is little injection quantity, it is related with the aerosol products which a liquid lappet phenomenon (after draw) and plugging do not produce easily.

[Translation done.]

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PRIOR ART

[Description of the Prior Art] Although a large number [the aerosol products through which it passes and which are injected with misty state, such as Asprey and a face toilet spray,], When injecting contents near [, such as a case where he would like to inject in point, eyes, a nose, a mouth,] membrane, in the product to which the active principle which can be used like drugs is limited, to lessen the injection quantity in consideration of usability or safety is desired.

[0003] When lessening the injection quantity, the path of the stem hole of a valve or the nozzle of a button (push button) is fundamentally made small. By inserting the member of specified shape into a passage, 1 or two long and slender gap channels or more are formed, and there is the method of making a passage sectional area small by that cause, or enlarging passage resistance as furthermore indicated to JP,7-132981,A or JP,10-218262,A.

[0004] However, when making the aperture of said valve or a button small or making the contents which contain a detailed non-melted object in the conventional method of making passage sectional areas small, and the contents containing the resin which dries and builds a coat blow off there is a problem which plugging generates at the hole extracted small or a passage. Therefore, an aperture and the path of a passage are difficult to lessen the injection quantity more in the contents which 0.2 mm is made into a limit and are easily got blocked. In the aerosol products which made the diameter of a nozzle of the button small even if it was contents which plugging does not generate furthermore easily, even if it is after stopping opening of a stem hole by operation of a valve, the liquid lappet phenomenon in which the contents which remain between the stem hole and the button nozzle hole are injected happens.

[0005] On the other hand, about a liquid lappet phenomenon, the contents which set space volume (volume between a nozzle hole and a stem free passage passage) in a button to 0.03 ml or less, and remain in the space at JP,58-31980,B are lessened, and preventing the liquid lappet after injection by it is indicated. However, the method of this liquid lappet prevention is effective only when the path of the nozzle hole of a button is an aerosol product with a usual

injection quantity of 0.2 mm or more, and if a path shall be about 0.08 mm, for example, a liquid lappet will produce it with the contents which remained in the upper space of the stem. Since the passage of the contents within a button is very narrow when making the contents containing a film-forming synthetic resin still like hair spray inject, the synthetic resin contained in contents dries and it is easy to produce plugging.

[0006]To JP,10-329879,A, the sintered compact which has a 5-100-micrometer detailed hole which is mutually open for free passage is inserted in the channel of contents, and the method of controlling a flow is indicated.

The effect whose after draw (liquid lappet) decreases is also indicated.

However, only by the injection quantity decreasing, it is not fully come to improve the problem of a liquid lappet. Since many holes are furthermore arranged at random by the sintered body, it becomes the course intricately bent as a passage. That is, it is interrupted by the wall between the following hole and hole in the back even if it passes one hole. Therefore, resin etc. adhere to the wall and it becomes easy to get it blocked.

[Translation done.]

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention]This invention has little injection quantity and it is making into the technical technical problem to provide the aerosol products which a liquid lappet and plugging moreover do not produce.

[Translation done.]

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MEANS

[Means for Solving the Problem] A button in which aerosol products of this invention were provided with a nozzle whose path of a nozzle is 0.08-0.15 mm, It has a stem to which the button is attached, and a filter inserted in upper space of the stem, and space in a stem free passage passage of a button, It is characterized by having two or more very small passages where a total cross section is larger than a cross-section area of a nozzle smaller [the filter / each cross-section area] than a cross-section area of a nozzle of a button.

[0009] As for said very small passage, it is preferred to have penetrated from one end of a filter to the other end. That whose cross-section areas of each very small passage are 5×10^{-5} - 0.015 mm^2 is preferred. As for injection quantity, it is still more preferred to consider it as a second in 0.1-0.3g /.

[0010]

[Embodiment of the Invention] The embodiment of the aerosol products of this invention is described referring to drawings next. The important section sectional view and drawing 2 which drawing 1 shows one embodiment of the aerosol products of this invention The important section enlarged drawing of drawing 1, The important section perspective view and sectional view showing one embodiment of the filter in connection with this invention in drawing 3 a and respectively drawing 3 b, Sectional view and drawing 5 b which shows other embodiments of the important section perspective view showing other embodiments of the filter in connection with this invention in drawing 4 a and respectively drawing 4 b and a sectional view, the button in connection with this invention in drawing 5 a, and a nozzle is the V-V line sectional view.

[0011] The aerosol products A shown in drawing 1 are provided with the following.

Package body 1.

The valve 2 moreover attached to an end opening part.

The button 4 attached in the stem 3 of the valve 2.

The filter 6 inserted in the stem 3 and the stem in the button 4 and the inside of the free

passage passage 5.

[0012]The package body 1 can use each publicly known thing conventionally. Usually, although it is synthetic resin vessels, such as metal cans, such as pressure-resistant aluminum and tin, polyethylene terephthalate, polyethylene, polypropylene, polyamide, polycarbonate, the thing of other raw materials, such as glass, can also be used. According to this embodiment, the bead part 7 for attaching a valve to the circumference of the upper bed opening of the package body 1 is formed. The package body 1 is filled up with propellant and an undiluted solution.

[0013]The valve 2 can also use a publicly known thing. The mounting cup 8 in which the valve 2 was provided with the mounting part to the package body 1 in this embodiment, It intervened between the housing 9 fixed to the center section of the mounting cup, the above-mentioned stem 3 arranged in housing, and the housing 9 and the stem 3, and has the valve rubber 12 which takes up the stem hole 11, and the spring 13 which energizes the stem 3 up.

[0014]The mounting cup 8 carries out press forming of the metallic thin plate, and the flange 14 of section semicircular state is formed in the periphery as a mounting part to a package body. The flange 14 is put on the bead part 7 of the package body 1 via the annular gasket 15. The cylindrical wall 16 prolonged downward is formed inside the flange 14. This cylindrical wall 16 fits in in the bead part 7 of the package body 1. The cylinder-like-object-with-base-like housing mounting part 17 is formed in the center section of the mounting cup 9. The clinch of the lower part of the housing mounting part 17 is carried out for inner, and it is fixing the housing 9 by engaging with the step of the housing 9. The breakthrough 18 which lets the stem 3 pass is formed in the center of the upper surface of the mounting cup 9 of a top panel, i.e., the center of the housing mounting part 17.

[0015]Said housing 9 has a cylinder-like-object-with-base-like gestalt and has the cylindrical projection 21 which attaches the dipping tube 20 to the lower part. The hole 22 which opens between the insides of a valve and the package body 1 for free passage is formed in the pars basilaris ossis occipitalis of the housing 9. Several ribs 23 which show the lower part of the stem 3 up and down to the inside of the housing 9 were formed radiately, and have stopped the lower end of the spring 13 to the lower end of the rib 23. The step 24 for carrying out the clinch of the valve mounting part 17 of the mounting cup 8 is formed in the upper part periphery of the housing 9. Furthermore, the crevice 25 which inserts the valve rubber 12 is formed in the upper surface. The housing 9 is usually products made of a synthetic resin, such as polyamide, polyacetal (Duracon), polyethylene, and polypropylene.

[0016]Said stem 3 presents tubed and the common-law marriage part of the valve rubber 12 and the circular sulcus 30 which fits in are formed in the pars intermedia of a sliding direction. The side of the circular-sulcus 30 bottom is right-angled to the axial center of a stem so that the omission to the upper part of the stem 3 may be prevented. The upper side

is made into the taper surface in order to incurvate the common-law marriage side of the valve rubber 12 downward, when the stem 3 is depressed. The bottom is made into the cylinder side which ****s to the rib 23 of the housing 9 from the circular sulcus 30. The annular deep groove 31 in which the upper part of the spring 13 is accommodated is formed in the lower end side of the stem 3. The passage 32 which carries out an opening to an upper bed is formed in the inside of the stem 3.

[0017]the upper path 33 where the passage 32 has a large path by the side of the upper part, and some of its bottom -- it consists of the lower path 34 of a byway, and the deep hole 35 is formed in the lower path 34 bottom. The lower path 34 is established in the circular sulcus 30 and a corresponding part, and the above-mentioned stem hole 11 is formed in the wall which divides between the lower path 34 and the circular sulcus 30, i.e., the wall which divides between the passage 32 in the stem 3, and the circular sulcus 30. The inside diameter of the stem hole 11 is usually about 0.3-0.6 mm.

[0018]The inside diameter of the upper path 33 is usually about 1.8-2.3 mm, and length is about 6-9 mm. The inside diameter of the lower path 34 is usually about 1.5-1.8 mm, and length is about 1.5-2.5 mm. Therefore, the step 35 is formed between the upper path 33 and the lower path 34. The step 35 is made into tapered shape in this embodiment. The inside diameter of the stem hole 11 is usually about 0.3-0.6 mm, and the thickness of the wall in which the length 11, i.e., a stem hole, is formed is usually about 0.5-1.0 mm. The stems 3 are usually products made of a synthetic resin, such as polyamide, polyacetal (Duracon), polyethylene, and polypropylene.

[0019]The center section 40 and the finger push part 41 for attaching said button 4 to the stem 3 provided in the upper bed, It has the nozzle mounting part 44 which makes the center section 40 continue the front side of the tubed outer wall 42 caudad prolonged from the circumference of the finger push part 41, and its outer wall, and attached the nozzle 43. The buttons 4 are usually products made of a synthetic resin, such as polyamide, polyacetal (Duracon), polyethylene, and polypropylene. The reinforcing rib which connects the center section 40 and the outer wall 42 is omitted.

[0020]The upper bed neighborhood of the stem 3 and the cylindrical stem insertion hole 45 which is formed in the undersurface side of the center section 40, and the stem free passage passage (longitudinal passage) 5 connected with the upper part from the upper surface of the stem insertion hole 45 in a nozzle hole has extended. The inside diameter of the stem free passage passage 5 is usually about 1.0-3.5 mm, and although length changes with the height of the button 4, it is usually about 1-10 mm.

[0021]The front part of the nozzle 43 and the hollow 46 which is formed in the front-face side of the outer wall 42, and the annular deep groove 47 which inserts the rear of the nozzle 43 further is formed. The annular deep groove 47 has entered in the nozzle mounting part 44. The communicating hole 48 extends back from the upper part of the annular deep groove 43, and it is open for free passage with the upper bed of the above-

mentioned stem free passage passage 5. The crevice 50 is formed between the cylinder part 49 surrounded among the nozzle mounting parts 44 in the annular deep groove 43, and the rear of the nozzle 43, and it has become an annular passage along which contents pass. The step 51 is formed in the front end part of the cylinder part 49, and he is trying to extend some of the annular passage.

[0022] Said nozzle 43 is provided with the following.

The disc-like front part 52 which contacts the bottom of the hollow 46, and the front face of the cylinder part 49.

The cylindrical rear 53 which extends in the back.

The shallow hollow 54 is formed in the surface of the front part 52, and some deep hollows 55 are formed in the back. And the nozzle 57 is formed in the center of the wall 56 in the meantime. The slot 58 is radially formed from the hollow 55 on the back. The hollow 54 where a front face is shallow is formed when making an injection pattern (spread) small, and it is not necessary especially to provide it without the necessity. The nozzle 43 is usually fabricated with synthetic resins, such as polyamide, polyacetal (Duracon), polyethylene, and polypropylene. The lock projection 59 which engages with the wall surface of the outside of the annular deep groove 47 of the button 4 is formed in the peripheral face of the rear 53 of the nozzle 43.

[0023] The inside diameter of the nozzle 57 is 0.09 mm or more preferably 0.08 mm or more (a cross-section area more than about 0.005 mm^2). A maximum is 0.13 mm or less preferably about 0.15 mm or less (a cross-section area below about 0.018 mm^2). If the inside diameter of the nozzle 57 is made smaller than 0.08 mm, it will become easy to produce plugging. If it is made larger than 0.15 mm, the injection quantity becomes large and is not preferred. The thickness of the aforementioned wall 56, i.e., the length of the nozzle 57, is about 0.15-0.4 mm preferably about 0.1-0.5 mm. When longer than it, the effect of the slot 58 is lost, and an injection pattern (spread angle) becomes small. When short, it is easy to be bent by vigor of injection, and the size of a nozzle hole is changeable.

[0024] As said filter 6 is shown in drawing 3 a, it is a cylindrical member and two or more very small passages 60 which extend in shaft orientations at the inside are formed. The filter 6 is an extrusion cast of synthetic resins, such as polyamide, polyacetal (Duracon), polyethylene, and polypropylene, and can use any hard and elastic synthetic resin. However, the intensity which is a grade which does not change the filter 6 by an injection pressure is required. It is because an expected effect cannot be attained if the flow path 60 changes and a diameter and length are changed. It may be what bundled the thin fibrous synthetic resin cylindrical and hardened it.

[0025] In this embodiment, as shown in drawing 3 b, the very small passage 60 is a round cross section. However, sectional shape is not restricted to this and can adopt various shape, such as a quadrangle, a triangle, a pentagon, and an ellipse form. In this embodiment, the number of the very small passages 60 is three, and they are provided outside a total of 11 at

8 and the inside. However, arrangement of a very small passage and a number are not limited to it.

[0026]In this embodiment, although the cross-section area of the one very small passage 60 changes with numbers of a very small passage, it is below 0.013 mm^2 preferably, and below at least 0.015 mm^2 makes it smaller than the cross-section area of the nozzle 57. When the very small passage 60 is circular, the inside diameter is preferably set to 0.13 mm or less 0.14 mm or less. If it says by a ratio, the cross-section areas of the very small passage 60 will be 90% or less of cross-section areas of the nozzle 57, and will be 80% or less preferably. When the cross-section area of a very small passage is larger than the above-mentioned maximum, the work as a filter which dams up beforehand the particles easily got blocked with the nozzle 57 becomes low.

[0027]The minimum of the cross-section area of a very small passage is an $8 \times 10^{-5} \text{ mm}^2$ grade, and when circular, diameters are about 10% of the cross-section areas of a nozzle by about 0.01 mm and a ratio. When a cross-section area is smaller than the minimum, a possibility of producing plugging in the very small passage 60 becomes high.

[0028]It is larger than the cross-section area of the nozzle 57, for example, the total cross section which doubled the cross-section area of all the very small passages 60 is more than 0.03 mm^2 preferably, and below 2 mm^2 is [more than 0.02 mm^2] below 1 mm^2 preferably. if it says by a ratio -- 1.3- of the cross-section area of a nozzle -- they are 1.5 to 150 times preferably about 200 times. When a total cross section is larger than the above-mentioned maximum, the operation which controls jetting volume becomes low. When a total cross section is conversely smaller than the above-mentioned minimum, the injection quantity becomes small too much and it becomes easy to get it blocked.

[0029]According to the embodiment of drawing 1 and drawing 2, the filter 6 is divided into the 1st filter 6a inserted into the upper path 33 of the stem 3, and the 2nd filter 6b inserted in the stem free passage passage 5 of a button. Therefore, after inserting the 1st filter 6a in the upper path 33 of the stem 3 densely and inserting the 2nd filter 6b in the stem free passage passage 5 of a button densely, the button 4 can be easily inserted in the stem 3. However, the 1st filter 6a and the 2nd filter 6b may be formed in one.

[0030]The filter 61 of drawing 4 a and drawing 4 b is replaced with the very small passage which penetrates an inside, and it has the eight slots 62 which extend on the surface at a longitudinal direction. The slot 62 is section semicircular state. When the filter 61 is inserted in the upper path 33 of the stem 3, this slot 62 is closed by that inner surface, and forms the very small passage 60. When the filter 61 is inserted in the stem free passage passage 5 of a button, a very small passage is formed with the inner surface of the stem free passage passage 5.

[0031]Even if the filter 61 which equipped such the surface with the slot 62 gets particles blocked, it can be made to restore to the performance of a basis easily by extracting from

the stem 3 etc., washing particles and inserting in the stem 3 etc. again.

[0032]The sectional shape of the slot 62 is not limited to the above-mentioned semicircular state, and the slot of various sectional shape, such as polygonal shape, such as a triangle and a quadrangle, and the shape of a half-ellipse, can be used for it, for example. Although restriction in particular does not have a number of the slot 62, either, 2-10000 are usually preferably made about into 5-5000. The cross-section area of the very small passage formed on the wall surface which contacts the slot 61 and the surface of a filter, capacity, sectional shape, and the desirable range of a diameter are substantially [as the cross-section area of the very small passage 60 of the filter 6 of above-mentioned drawing 3, capacity, and a diameter] the same.

[0033]The very small passage which penetrates an inside like drawing 3, and the slot formed in the surface can also be used together to one filter.

[0034]Drawing 5 a shows other embodiments of the button body 71, its button body 71, and the nozzle 43 made to 1/4 in. The projected rim 72 of the section triangular shape of a large number prolonged in the axial direction of the cylinder part is formed in the surface of the back end neighborhood of the cylinder part 49 surrounding the annular deep groove 48 of the button body 71. As shown in drawing 5 b, those projected rims 72 1/4 in with the inner surface 53a of the cylindrical rear 53 of the nozzle 43, and form many passages 73. This portion also does the same operation as a filter so at the point which interrupts passage of the particles in contents. However, since there is no effect of preventing a liquid lappet, it is preferred to use together with the filters 5, such as drawing 2.

[0035]The aerosol products of this invention can be especially used without limitation, if it is a product injected with misty state. As an undiluted solution, to substrates, such as water, univalent alcohol of the carbon numbers 2-5, and kerosene. What blended suitably fats and oils, a low, hydrocarbon, higher fatty acid, higher alcohol, ester species, silicone, a surface-active agent, a moisturizer, a water soluble polymer, a pH adjuster, sugars, amino acid, organic amine, an antioxidant, a rust-proofer, perfume, various active principles, etc. with the use is used.

[0036]As propellants used for the aerosol products of this invention, it can constitute from compressed gas, such as chlorofluorocarbon, such as liquefied petroleum gas, wood ether, and hydrofluorocarbon, and these mixed gas, nitrogen, carbon dioxide, air, nitrous oxide, and argon, or those mixtures. As for especially the pressure in a container, about 0.2-0.8 MPa is preferred about 0.1-1.0 MPa.

[0037]When internal pressure of injection quantity is high, the injection quantity falls, so that internal pressure will fall only depending on the cross-section area of a nozzle, if a pressure declines mostly. However, it is preferred to carry out in about 0.1-0.3g/[a second and] in any case. It is because jet becomes unstable, and the purpose of injection cannot fully be attained when [a little] there is more 0.3g /than a second when there is less injection quantity of 0.1g /than a second.

[0038]The aerosol products of this invention specifically A set agent, a treatment agent, Sprays for the hairs, such as polish, a ~~fat~~ setting, hair dye, and a decolorant, a hair restorer, Sprays for scalp, such as a tonic agent and a cleansing agent (drop [fat] the scalp), Face toilet, a cleansing agent, a moisturizer, a vitamin tablet, a whitening agent, a pre shaving lotion, An aftershave lotion, an astringent, sunscreen, an antiphlogistic sedative drug, a germicide, For [, such as sprays for the skins, such as an athlete's foot remedy, a deodorizer, an antiperspirant, a perfume, and a repellent and a mouth deodorant] the mouths, Sprays for membrane, such as collunarium and ear dripping medicine, an insecticide, a deodorizer, an aromatic, a glass cleaner, It can apply to industrial use sprays, such as home use, such as a water-repellent and polish, a spray for cars, lubricant, a rust resistor, and a release agent, etc., and can be used conveniently also for products easily got blocked, such as especially hair spray.

[Translation done.]

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EXAMPLE

[Example] The example of the aerosol products of this invention is described below, comparing with a comparative example.

[Example 1]

Hair-spray formula: The contents for hair spray were manufactured by the undiluted solution formula and aerosol formula which are shown below.

Undiluted solution formula: Dialkylamino ethyl acrylate / acrylic-acid-alkyl-ester copolymer 8.0 % of the weight Sorbitan sesquioleate 0.5 silicone-oil 0.3 ethyl-alcohol 91.2 Perfume Optimum dose ----- Sum total 100.0 % of the weight Aerosol formula: The above-

mentioned undiluted solution 50.0-% of the weight LPG 50.0 ----- Sum total 100.0 % of the weight [0040] Prepare the aerosol products which filled up with the above-mentioned contents the aerosol apparatus shown in drawing 1, and. The filter of the shape of a bush which equipped the upper path (refer to numerals 33 of drawing 2) of a stem and the stem free passage passage (refer to numerals 5 of drawing 2) of the button with the conditions shown in Table 1 was inserted, the aerosol apparatus of Examples 1-5 and the comparative examples 1 and 2 was manufactured, and the plugging examination was done. The diameter of a filter is a thing inserted in the upper path of the stem, is a thing inserted in 1.8 mm and a stem free passage passage, and was 1.5 mm.

[0041]

[Table 1]

	ボタン噴孔径 (mm)	微少通路径・ 数(μm×本)	噴射量 (g/秒)	液垂れ	詰まり試験
実施例1	0.1	50×10	0.15	○	○
実施例2	0.1	20×50	0.18	○	○
実施例3	0.1	80×8	0.21	○	○
実施例4	0.15	80×8	0.26	○	○
実施例5	0.08	20×50	0.12	○	○
比較例1	0.15	フィルタなし	0.41	×	×
比較例2	0.1	0.1mm×5	0.33	○	×

[0042]At the plugging examination in the above-mentioned table 1, the cycle of neglect and (i) sample test ~~filter~~ing was repeated at neglect and (iii)5 ** for one week in (i) sample test ~~filter~~ing and (ii)25 ** on the 1st. In evaluation of a liquid lappet and a plugging examination, ~~filter~~ness and "x" show ["O"] a defect.

[0043]As shown in Table 1, the good result was obtained by both a liquid lappet and plugging in Examples 1-5 using the ~~filter~~ter provided with the very small passage of a path smaller than the path of the nozzle of a button in the range with a diameter of a button nozzle hole of 0.08-0.15 mm. On the other hand, the liquid lappet was also got blocked with the comparative example 1 which does not use a ~~filter~~ter, and an examination was not good, either. Although there was an effect in prevention of a liquid lappet in the aerosol apparatus of the comparative example 2 which uses the ~~filter~~ter provided with the passage of the same path as the diameter of a nozzle hole of a button, the result of the plugging examination was poor. About the number of the very small passage of a ~~filter~~ter, each of 50 things of eight things was also good.

[0044]These results show that the aerosol apparatus of this invention is effective in the ability to prevent both a liquid lappet and plugging.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1]It is an important section sectional view showing one embodiment of the aerosol products of this invention.

[Drawing 2]It is an important section enlarged drawing of drawing 1.

[Drawing 3]Drawing 3 a and drawing 3 b are the important section perspective views and sectional views showing one embodiment of the filter in connection with this invention, respectively.

[Drawing 4]Drawing 4 a and drawing 4 b are the important section perspective views and sectional views showing other embodiments of the filter in connection with this invention, respectively.

[Drawing 5]Drawing 5 a is a sectional view showing other embodiments of the button in connection with this invention, and a nozzle, and drawing 5 b is the V-V line sectional view.

[Description of Notations]

A Aerosol products

1 Package body

2 Valve

3 Stem

4 Button

5 Stem insertion hole

6 Filter

32 Passage

33 Upper path

34 Lower path

43 Nozzle

57 Nozzle

60 Very small passage

61 Filter

62 Slot

[Translation done.]

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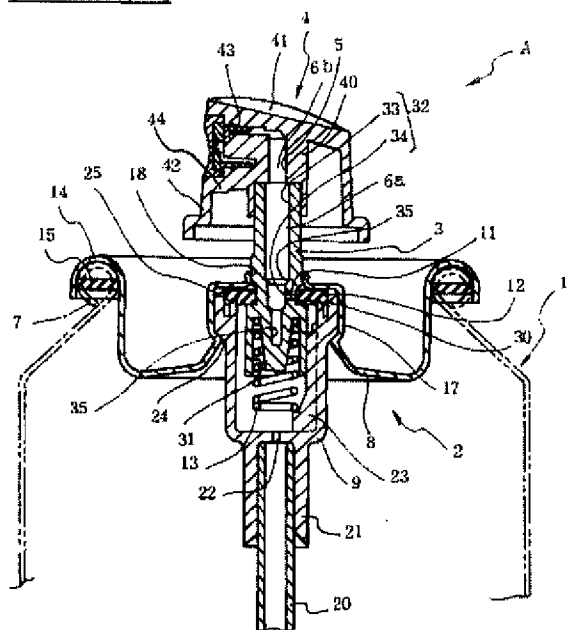
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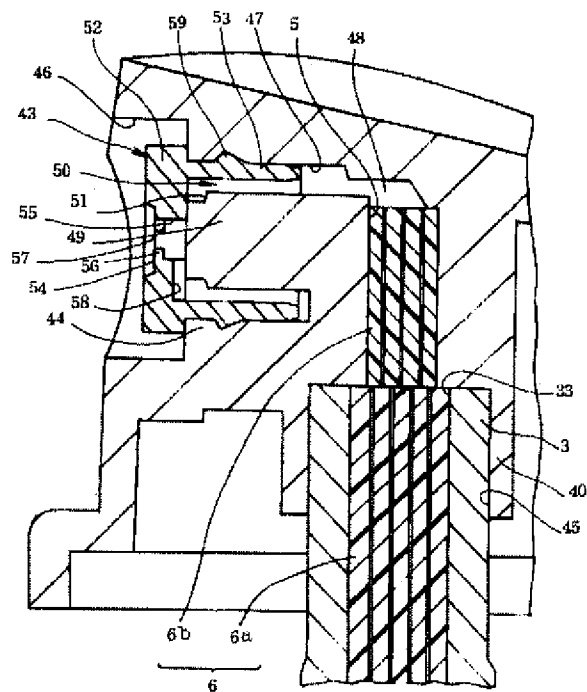
DRAWINGS

[Drawing 1]



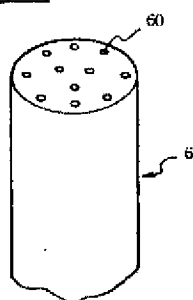
- | | |
|-------------|-----------|
| A : エアゾール製品 | |
| 1 : 容器本体 | 32 : 通路 |
| 2 : ハルブ | 33 : 上部通路 |
| 3 : ステム | 34 : 下部通路 |
| 4 : ボタン | 43 : ノズル |
| 5 : ステム挿通孔 | |
| 6 : フィルター | |

[Drawing 2]

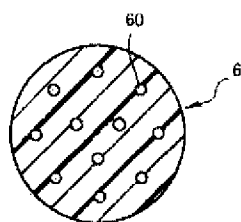


[Drawing 3]

(a)

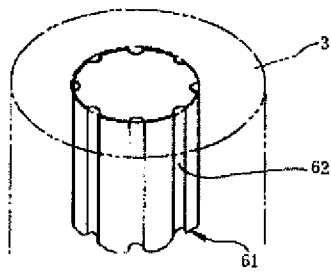


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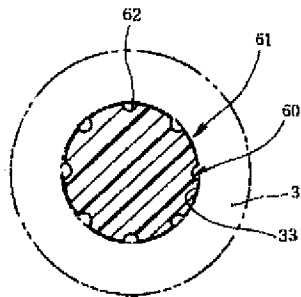


[Drawing 4]

(a)

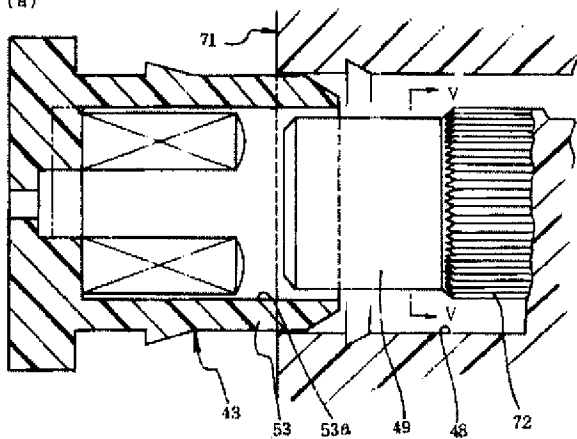


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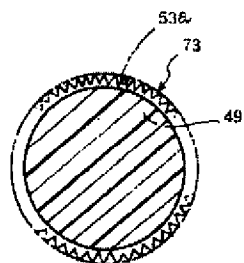


[Drawing 5]

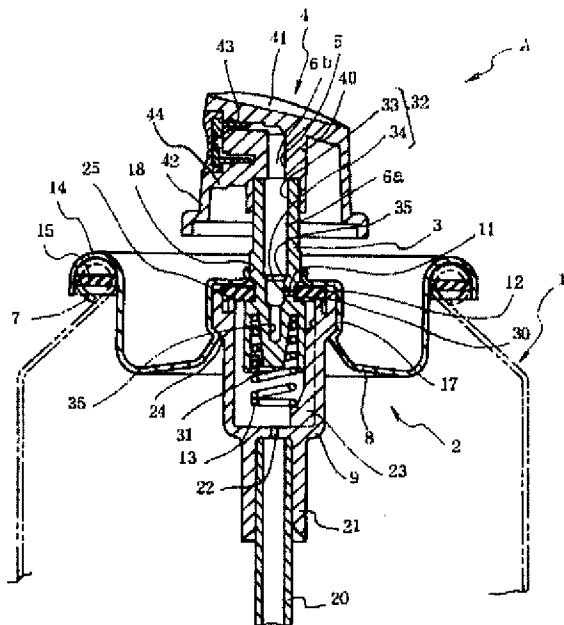
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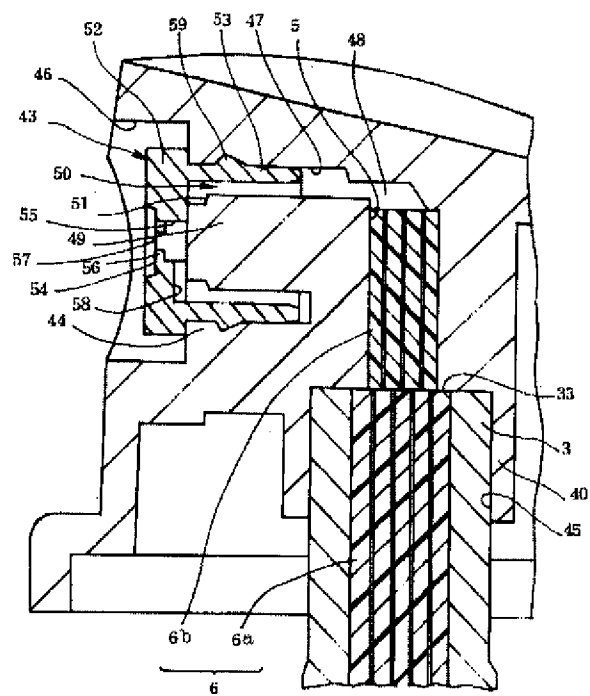


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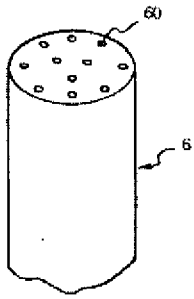
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 1: 容器本体
 2: バルブ
 3: ステム
 4: ボタン
 5: ステム挿通孔
 6: フィルター
 7: 通路
 8: 上部通路
 9: 下部通路
 10: ノズル

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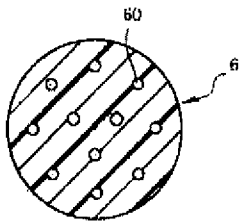


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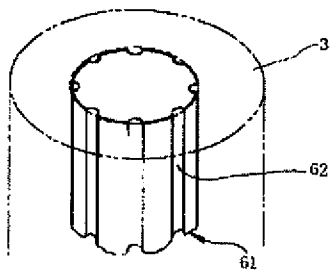


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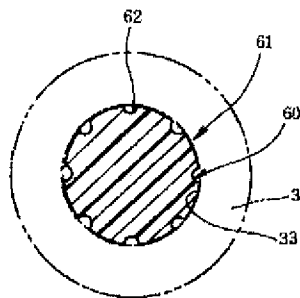


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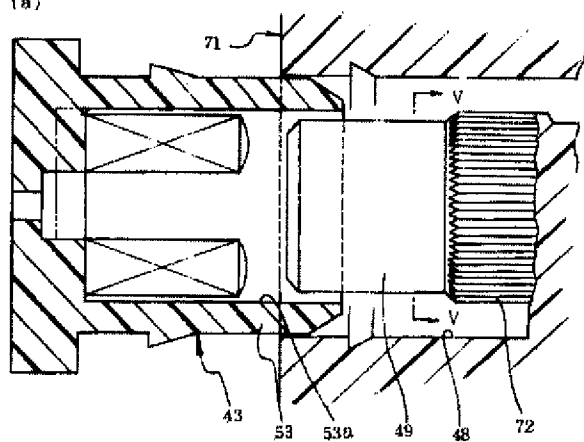


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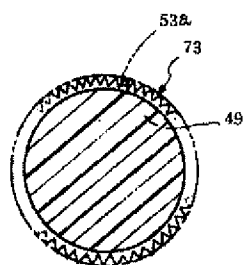


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(a)



(b)



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